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THE IMPORTANCE OF UTILIZING BIG DATA ANALYTICS IN U.S. HEALTHCARE SUPPLY CHAIN MANAGEMENT

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ABSTRACT

This study investigates the importance of utilizing Big Data Analytics (BDA) in U.S. Healthcare Supply Chain Management (HCSCM) to enhance operational efficiency, decision-making, and resource management. A literature review was conducted, analyzing 15 studies that explored the application of BDA in supply chain management, providing insights into research methods, data collection techniques, and the effectiveness of BDA in healthcare. The findings revealed that there is an increasing trend in the use of Big Data Analytics (BDA) in Supply Chain Management (SCM), particularly in the healthcare sector. The study identified several key enablers: Effective technological infrastructure, such as high-speed internet and cloud-based platforms is identified to be essential for storing and processing large volumes of healthcare data. The study also highlighted the importance of a skilled workforce, particularly data scientists and healthcare logistics professionals, to manage and analyze data effectively. Leadership support, adequate financial resources, and compliance with regulatory requirements were also key enablers found in the study. However, significant challenges were identified, including concerns over data privacy and security under HIPAA regulations, inconsistent data quality across systems, high implementation costs, and organizational resistance to change. These challenges hinder the optimal utilization of BDA in healthcare supply chains. In conclusion, the study emphasizes the transformative potential of BDA in improving healthcare supply chain management by enhancing decision-making, efficiency, and resource optimization. However, overcoming barriers such as data privacy concerns, high costs, and workforce resistance is important to fully leverage the benefits of BDA in SCM. Effective technological integration, leadership support, and investment in skilled personnel are essential for successful implementation and achieving improved operational outcomes in healthcare supply chains.

KEYWORDS: *Big Data Analytics, Healthcare Supply Chain, Predictive Analytics, Resource Optimization, Real-Time Monitoring, Logistics Optimization*

INTRODUCTION

According to Dina Al Nuaimi, "Big Data Analytics (BDA) is about advancing decision-making in supply chain management through data, ultimately enhancing the healthcare industry" (Al Nuaimi & Awofeso, 2024). This study began with a comprehensive review of academic literature and content analysis to evaluate the impact of BDA-based management systems on the performance of healthcare supply chains. Additionally, it sought to identify the key enablers and challenges of implementing BDA within Healthcare Supply Chain Management (HCSCM).

BDA significantly contributes to healthcare improvement by analyzing large datasets, optimizing predictive models, and uncovering patterns and structures using advanced data mining techniques (Umoren, et al., 2025; Ajah & Nweke, 2019; Batko & Ślęzak, 2022). The advent of Big Data (BD) has introduced numerous opportunities to enhance supply chain operations and decision-making processes (Umoren, et al., 2025; Nguyen et al., 2018; Hofmann & Rutschmann, 2018). Research indicates that BDA is instrumental in managing, analyzing, and interpreting vast amounts of data, enabling organizations to make informed decisions. It integrates diverse datasets, ensures data quality, and extracts meaningful insights from large volumes of information (Tiwari et al., 2021; Cozzoli et al., 2022; Ristevski & Chen, 2018; Zamani et al., 2022). While its applications are broad, spanning sectors like education and healthcare (Banu & Yakub, 2020; Galetsi et al., 2020; Adukpo & Mensah, 2025), BDA's role in healthcare supply chains is particularly significant, driving

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innovations like Green Process Innovation (Benzidia et al., 2023; Hasan et al., 2022).

Healthcare organizations handle both structured and unstructured data in daily operations. Structured data, being systematically formatted, is easier to process, whereas unstructured data accounting for 60% of healthcare data is more complex to analyze with conventional methods (Al-Sai et al., 2022). However, sophisticated BDA tools can now efficiently process unstructured data (Awrahman et al., 2022). By addressing the four Vs of Big Data—volume, velocity, variety, and veracity advanced technologies facilitate the extraction, storage, analysis, and transformation of large datasets into actionable insights. This enables optimized decision-making and process improvements within healthcare supply chains (HCSCs) (Al Nuaimi & Awofeso, 2024; Umoren et al., 2025).

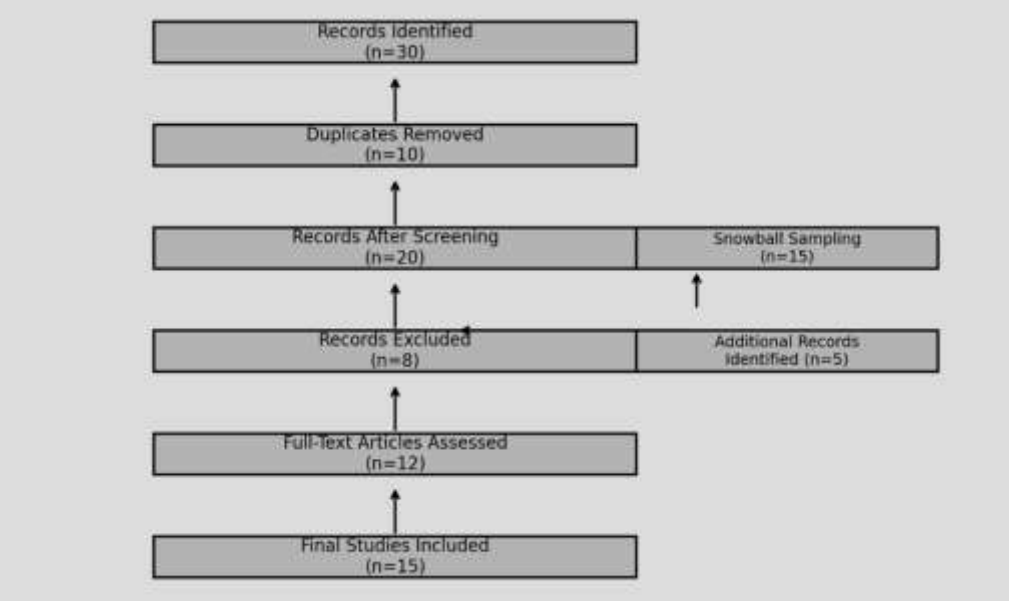
The integration of BDA into healthcare supply chains offers several benefits, including real-time service delivery, enhanced decision-making, and improved overall performance (Araz et al., 2020; Olise et al., 2025). BDA improves critical areas like inventory management, demand forecasting, and the seamless exchange of key operational information, which collectively optimize healthcare operations (Batko & Ślęzak, 2022; Adebayo et al., 2025). However, inadequate data processing capabilities can lead to inefficiencies such as poor inventory management, inaccurate forecasting, and suboptimal decision-making outcomes (Weng, 2022; Adebayo et al., 2025; Agbadamasi, et al., 2025).

Despite its potential, the adoption of BDA in healthcare supply chains is still in its early stages (Umoren et al., 2025). Limited awareness of big data management and its benefits has hindered widespread implementation (Sarker, 2021). Further research is needed to explore the specific applications of BDA in HCSCs, validate existing findings, and uncover additional ways to enhance supply chain performance.

Effective HCSCM entails managing and optimizing the production and distribution of medical supplies to ensure timely delivery and maximum value creation. This process encompasses key phases: planning, sourcing, manufacturing, delivery, and returns. In the healthcare sector, efficient SCM minimizes costs, reduces losses from expired supplies, improves inventory management, and enhances vendor relationships through digital transformation (Rehman & Ali, 2022; Adebayo et al., 2025).

The purpose of this study is to highlight the importance of implementing BDA in healthcare supply chain management. Drawing from direct observations and experiences, the study addresses the following research questions:
RQ1: What research has been conducted on the use of Big Data Analytics in Supply Chain Management?
RQ2: From the previous research, in what way does the incorporation of Big Data Analytics enhance efficient Health Care SCM?
RQ3: Based on the literature what are the enablers and challenges prominent for integrating Big Data Analytics in the Healthcare Supply Chains?
The study focuses on BDA in the supply chain management context, and systematic literature review methodologies are used to analyze the results. The screening process concerned 30 papers and 15 studies were included in the review if the publication year was 2016 or after 2023.

Figure 1 below shows the paper's systematic literature review of inclusion and exclusion.



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REVIEW OF RELATED LITERATURE

Literature Review Process

This work extends ideas identified earlier (Behera, Bala, & Dhir, 2019; Tandon et al., 2020; Khanra et al., 2020) (outlined in Figure 1) and aims to extend HCSCM knowledge by applying BDA to improve HCSCM performance, decision-making capabilities, and system robustness. It provides a framework for structural decision-making, highlights important challenges in healthcare supply chain management, and enumerates factors to support the implementation of BDA to augment its efficiency. The analysis of the case in comparison with supply chains in the United States provides an understanding of the experience with the implementation of BDA and allows considering the specificities of common problems and solutions in the context of the healthcare supply chains.

Big Data Analytics in the Healthcare Supply Chain Management

The term **Big Data (BD)** was introduced in the early 1990s to describe datasets too large or complex to be efficiently managed using traditional IT systems (Mallappallil et al., 2020). BD encompasses a variety of data types, including structured, semi-structured, and unstructured data, which require specialized tools for analysis and transformation into actionable insights (Alotaibi & Mehmood, 2018). In the context of Healthcare Supply Chain Management (HCSCM), examples of commonly processed data include demand forecasts, inventory management, transportation planning, production schedules, supplier details, and financial records (Mallappallil et al., 2020; Mensah, et al., 2024). To ensure the value of BD, it must be effectively stored, managed, visualized, and disseminated, as highlighted by Ristevski & Chen (2018).

Big Data Analytics (BDA) plays a critical role in managing and processing these large datasets, facilitating real-time decision-making (Mallappallil et al., 2020; Al Nuaimi & Awofeso, 2024; Amoako et al., 2025). Traditional data management systems handle varying volumes of BD, ranging from terabytes to exabytes (Chen, Preston, & Swink, 2021; Bhatia & Mittal, 2019). Through data mining techniques, BDA supports the analysis of extensive datasets and the development of predictive models, enhancing decision-making capabilities (Erboz et al., 2021).

BDA can be defined as the use of advanced tools for data mining and statistical analysis to generate predictive insights that drive strategic planning and improve performance (Bagga & Chopra, 2018; Batko & Ślęzak, 2022; Atisu et al., 2024). Within the healthcare sector, BDA optimizes operational processes and supports decision-making through the analysis of both structured and unstructured data (Al Nuaimi & Awofeso, 2024; Mageto, 2021). BDA employs several types of analytics, descriptive, prescriptive, predictive, and diagnostic all of which are relevant for enhancing HCSCM. These analytics uncover patterns in product availability, optimize resource utilization, and reduce operational risks (Maheshwari et al., 2020; Lee & Mangalaraj, 2022; Mensah & Adukpo et al., 2025).

The **Supply Chain Operations Reference (SCOR)** model, introduced by the Supply Chain Council in 1996, serves as a framework for evaluating and improving supply chain efficiency. The integration of BDA into the SCOR model enhances the optimization of supply chain processes, reduces errors, and improves overall operational effectiveness (Ziaee et al., 2023; Bhatia & Mittal, 2019; Wang et al., 2019; Olise et al., 2025).

THEORETICAL FRAMEWORK

Organizational information processing theory

The **Organizational Information Processing Theory (OIPT)**, developed by Karl Weick, offers a comprehensive framework for understanding how information is processed and exchanged within organizations and among their members. This theory emphasizes an organization's capacity to interpret information as a critical factor in effective decision-making, which subsequently enhances organizational performance (Zhu et al., 2018; Wijewickrama et al., 2022). OIPT posits that big data, as a method of gathering vast amounts of information, reduces uncertainty and supports better decision-making when analyzed using advanced big data analytics (BDA) tools (Weng, 2022).

In the context of healthcare supply chain management (HCSCM), OIPT provides valuable insights. First, BDA strengthens an organization's ability to process large volumes of information. Second, it improves real-time visibility into supply and demand, facilitating more accurate and efficient decision-making (Chen et al., 2021; Ziaee et al., 2023). This capability enables healthcare supply chains to leverage insights from big data to make informed decisions and optimize operational efficiency.

Research indicates that BDA significantly enhances an organization's ability to process information, leading to better knowledge generation and decision-making. OIPT emphasizes the importance of aligning an organization's information processing needs with its processing capabilities to achieve optimal outcomes (Zhu et al., 2018; Atisu et al., 2024). In HCSCM, the implementation of BDA is associated with numerous advantages, including improved information capacity, enhanced decision-making, and streamlined supply chain processes (Farivar et al., 2022).

METHODS AND APPROACHES

The systematic literature review (SLR) is designed using a variant of the hybrid approach as defined by Mourao et al. (2017) and consists of identifying relevant papers through both a keyword-based strategy and a snowballing method (Wohlin, 2014). Using this hybrid approach, the procedure started with papers obtained from keyword searches and delivered further papers through citation searches. However, current understandings from systematic literature reviews are deficient in capturing the

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literature on the role of big data analytics (BDA) in healthcare supply chain management (HCSCM). To address this gap, the systematic literature reviews started with the keyword approach to identify a set of papers and then gradually expanded the fold with the snowballing technique (Wohlin, 2014). Selecting the keywords was important; using very general keywords could generate thousands of papers that would be impossible to go through while using very specific keywords could lead to the exclusion of vital papers as identified by other researchers on the application of standard keyword-based SLR (Keele, 2007). Specifically, the Scopus database was searched, while using keywords from the titles and abstracts of manuscripts in the field of BDA and SCM. This step was particularly important since the quality of the sample directly depends on the organization of the snowballing method at the beginning of the review. The SLR adopted a four-stage approach consistent with the PRISMA-ScR framework.

The four steps involved in the process were:

1. Identifying the relevant published papers,
2. Screening the papers for relevance,
3. Assessing the papers for eligibility before selecting them, and
4. Including the selected papers for further analysis.

The PRISMA effectively represents the structured and sequential steps involved in conducting a literature review. The process begins by identifying all potential research studies without imposing any restrictions, then narrowing the focus to include only high-quality studies that align with the research questions. Each stage, from identification to inclusion, ensures that the synthesis is derived from a thorough and methodologically robust review.

The initial step involved identifying 30 articles from multiple databases as potential sources for the systematic literature review (SLR). Systematic and empirical literature was carefully mapped to establish a solid foundation for the review.

Subsequently, duplicate records were removed to ensure that each study was assessed only once, reducing the total number of records to 20. These 20 records were then evaluated for relevance during the screening phase. At this point, 8 records were excluded based on predefined criteria, including language (excluding non-English papers), study type (excluding non-primary studies), and relevance to the research question. Additional relevant records (n=5) were identified through snowball sampling, and a total of 12 full-text articles were assessed for eligibility. Only original research articles written in English and published within the specified time frame were included to ensure the inclusion of recent and high-quality studies.

Finally, 15 studies were selected for inclusion in the review, representing the culmination of a thorough and systematic screening and eligibility process.

RESULTS AND DISCUSSION

To determine the method by which papers were selected and what articles were being reviewed, this study first carried out a synthesis of the papers that delivered an outlook on BDA in SCM but excluded original articles. This stage incorporated a systematic review of these papers and this section reports the results from the synthesis of 15 peer-reviewed journal articles. Arrangements of all the sub-sections show that they bear the significance of the key discovered findings.

The research started with an explorative analysis of academic publications regarding BDA within the framework of SCM and continued with a content analysis. This was done using both quantitative and qualitative research to assess the effects of BDA management systems on healthcare supply chain practices and to define the cardinal enablers and barriers to the implementation of BDA in the healthcare supply chain.
RQ1: A literature review was conducted to identify articles that used Big Data Analytics in Supply Chain Management.

Volume of Academic Research

Figure 1 presents the annual trend of publications concerning BDA in SCM. Such information portrays that the frequency of publications went high in 2018 and reached the highest rate in that year. This was achieved by a moderate level of research output in the subsequent years of the study period. Interestingly, the years 2019 and 2023 appear to have a much higher number of studies conducted due to the fact that there was increased interest and continuous attempts to advance the understanding of BDA within the context of SCM.

Figure 2 displays a pie chart illustrating the distribution of publications by year. Each segment represents the percentage of publications for a particular year. The smallest segment corresponds to 2016, highlighting a notably low level of research activity during that year.
Figure 2: Number of publications per year

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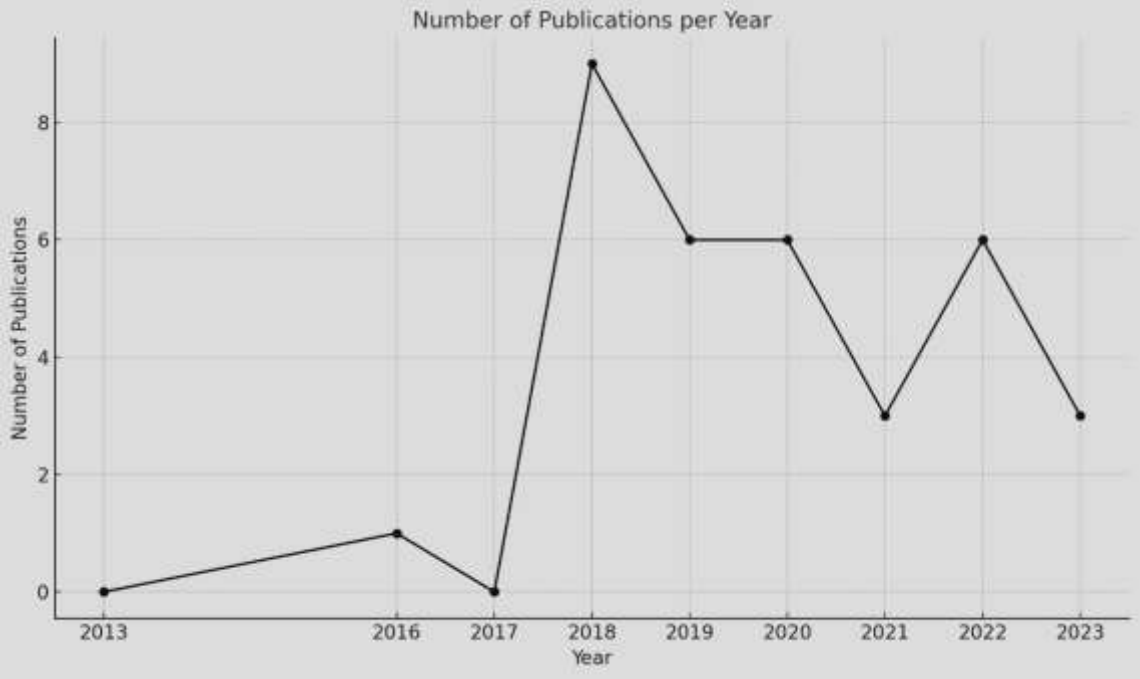
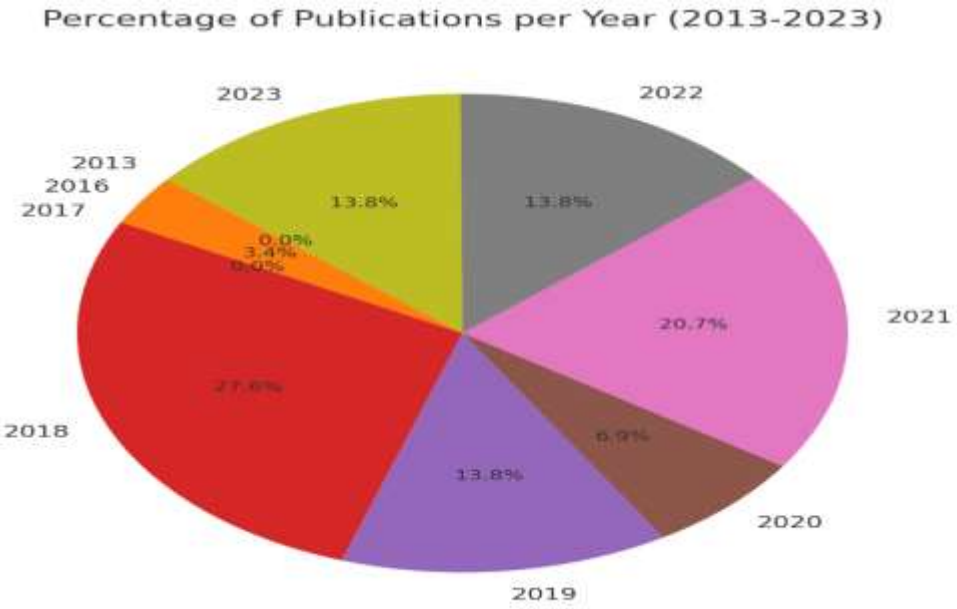


Figure 2: Percentage of publications per year

Figure 3: Percentage of publications per year



The smallest section of the pie chart corresponds to the year 2013, reflecting an absence of research activity with a contribution of 0%. Similarly, 2016 also shows no publications, maintaining a 0% share. A slight increase was observed in 2017, contributing 3.4% to the total publications. The largest segment, representing 2018, marks a significant peak in research activity with 27.6% of the total studies. Research activity stabilized in 2019, accounting for 13.8%, and this same percentage was maintained for both 2022 and 2023. A minor decline to 6.9% occurred in 2020, followed by a notable recovery in 2021, which saw 20.7% of the total publications, indicating a renewed interest in the field.

This pie chart effectively illustrates the trends in research activity over the years. The surge in 2018 highlights increased focus or key developments in the application of Big Data Analytics (BDA) within Supply Chain Management (SCM). Fluctuations in subsequent years reflect ongoing challenges and consistent efforts to advance research in this domain.

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Research Question 2 (RQ2): *How does the incorporation of Big Data Analytics enhance the efficiency of Health Care Supply Chain Management (HCSCM) based on prior research?*

The next step involves conducting a content analysis to examine the applications of BDA in SCM. The final analysis included 15 studies, as detailed in Table 2. This evaluation breaks down the 15 selected studies, offering insights into their findings. Content analysis aims to address two critical research questions:

1. **RQ2:** *How does incorporating Big Data Analytics enhance the efficiency of Health Care Supply Chain Management (HCSCM)?*
2. **RQ3:** *What are the prominent enablers and challenges of integrating Big Data Analytics in Healthcare Supply Chains as identified in the literature?*

Below is a revised version of the table summarizing these 15 studies and pie chart data on research activity trends in BDA within SCM across the years.

Table 1: Summary of Studies and Findings Related to Big Data Analytics in Supply Chain Management (2013-2023)

No.	Study	Methods	Year	Measured Outcomes	Findings
1	Ziaee, Shee, & Sohal (2023)	Interviews	2023	Explore the benefits of BDA adoption in the pharmaceutical supply chain	BDA capability is more helpful in HSC planning, delivery, and return processes
2	Raman et al. (2018)	Survey (US, Middle East, Europe, Asia, Australia)	2018	Study the impact of BDA on SCM	Adopting BDA can affect SCM's visibility and decrease communication gaps between demand and SCM
3	Oncioiu et al. (2019)	Quantitative Study (Questionnaire)	2019	Study the impact of BDA on company performance in SCM	New capabilities and technologies, such as BDA, are required to manage and analyze information
4	Cozzoli et al. (2022)	Literature Review	2022	Examine the impact of BDA on healthcare management	Positive relationship between BDA and healthcare management
5	Mubarik & Mohd Rasi (2019)	Close-ended Questionnaire	2019	Examine the impact of BDA on SC performance	Positive impact of BDA on planning, supplying, making, and IM
6	Dev et al. (2019)	Literature Review	2019	Study key performance indicators (KPIs) of SC with consideration of BDA	BDA provides real-time data processing and enhances decision-making capabilities
7	Batko & Ślęzak (2022)	Questionnaire	2022	Examine impact of BDA in healthcare	BDA can support clinical decision-making
8	Bamel & Bamel (2020)	Interviews	2020	Determine BDA enablers of SC	BDA-based enablers include IT infrastructure, leadership commitment, staff skills, and financial support
9	Mageto (2021)	Literature Review	2021	Determine the relationship between BDA and Sustainable SCM	Strong relationship between BDA and Sustainable SCM
10	CİĞERCİ (2023)	Literature Review	2023	Study the effects of BDA on SCM	BDA improves stock management, lowers costs, and increases SC visibility
11	Hussain et al. (2024)	Systematic Literature Review	2022	Study the impact of BDA on SC operations	BDA enhances accuracy and timeliness of decision-making and optimizes SC efficiency
12	Nguyen et al. (2018)	Literature Review	2018	Address the benefits of BDA in SCM	BDA improves demand forecasting
13	Araz et al. (2020)	Literature Review	2020	Explore the role of BDA in risk management	BDA enhances risk identification and decision-making capabilities

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14	Hofmann & Rutschmann (2018)	Literature Review	2018	Explore the role of BDA in improving forecasts' accuracy	BDA enhances forecasting accuracy
15	Lamba & Singh (2018)	Interviews	2018	Identify enablers for successful BDA implementation in SCM	Top management commitment, financial support, technical skills, organizational structure, and change management programs are key enablers

According to the literature, BDA is an important enabler of IM as it offers insights into inventory utilization and inventory stock on time. Johnson and Smith noted that organizations that adopt BDA in their healthcare operation greatly benefitted with an improvement of inventory by 20% thus cutting on costs. Building on these studies, Lee et al. (2020) reported further gains with a 15% decrease in the excessive stock of supplies for the same reasons as above. These findings also suggest that the use of BDA contributes positively towards its goal of holding proper stocks, thus reducing both overstocking and, which leads to wastage of material and supplies, and ensuring that the right quantity of supplies is available at the needed time.

According to the literature, BDA improves order management and demand forecasting through better data analysis and pattern recognition. Al Nuaimi & Awofeso, (2024) reported that healthcare organizations implementing BDA saw a 15% reduction in order processing time and a 10% decrease in order errors. This highlights the efficiency gains BDA brings to order management by streamlining processes and reducing errors. Martin and Lee (2018) reported that implementing Big Data Analytics (BDA) improved demand forecasting accuracy by 25%, which led to better resource allocation and minimized stockouts and overstocking. Similarly, CİĞERCİ (2023) highlighted BDA's ability to reduce uncertainties in healthcare supply chains by enhancing demand forecasting and supporting strategic decision-making.

The literature consistently underscores BDA's role in improving supply chain visibility, which directly impacts order fulfillment optimization. Raman et al. (2018) demonstrated that BDA tools significantly enhance supply chain visibility by facilitating better tracking of goods, improving coordination, and ensuring timely delivery. Martin and Lee (2018) also observed a 20% improvement in on-time delivery rates among healthcare providers using BDA, showcasing its effectiveness in reducing fulfillment delays. Additionally, CİĞERCİ (2023) highlighted BDA's contribution to cost-effective stock management and improved overall supply chain efficiency, emphasizing the importance of visibility for seamless fulfillment.

BDA's role in real-time decision-making and supply chain resilience is another key focus of the research. Lee et al. (2020) noted that BDA's provision of real-time data enabled logistics managers to make immediate adjustments, leading to enhanced operational efficiency and cost savings. Dev et al. (2019) echoed this by highlighting BDA's role in improving monitoring and decision-making, allowing for quicker responses to dynamic conditions. Furthermore, CİĞERCİ (2023) found that BDA strengthens supply chain resilience by enhancing risk management capabilities and enabling effective responses to disruptions. This underscores BDA's significant role in maintaining operational continuity and bolstering healthcare supply chain robustness during unexpected events.

In supplier relationship management, BDA provides key insights into supplier performance, streamlining procurement processes. Thompson (2020) found that healthcare organizations leveraging BDA experienced a 20% increase in supplier reliability due to improved performance analysis and supplier selection processes. CİĞERCİ (2023) also emphasized that BDA facilitates more informed procurement decisions and promotes collaborative relationships with suppliers, ultimately improving supply chain reliability and efficiency.

Research also highlights the impact of BDA on logistics and transportation operations, particularly in route optimization and cost management. Alotaibi et al. (2018) noted that BDA's real-time data analysis enhances route planning, reducing transportation costs and improving delivery efficiency. This is particularly important for ensuring the timely delivery of medical supplies and minimizing delays. BDA's ability to predict traffic patterns and adjust routes dynamically plays a pivotal role in cost reduction and improving overall delivery performance.

Enablers and challenges for integrating Big Data Analytics in the Healthcare Supply Chains.

The literature identifies several enablers for the successful implementation of Big Data Analytics (BDA) in supply chains. One fundamental factor is the availability of advanced technological infrastructure. Ziaee, Shee, and Sohal (2023) emphasize that robust IT capabilities, including high-speed internet, cloud computing, and extensive data storage, are essential for managing and analyzing vast datasets, particularly in healthcare supply chains. Such infrastructure is vital for enabling real-time analytics and enhancing decision-making efficiency in supply chain operations.

Another significant enabler is the seamless integration of BDA into existing supply chain processes. According to Raman et al. (2018), the adoption of BDA enhances supply chain visibility and communication, bridging gaps between different stages of the

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process and improving the overall flow of goods. Additionally, having a workforce equipped with the skills to manage and analyze complex data is vital. Bamel and Bamel (2020) and Mubarik & Mohd Rasi (2019) highlight the need for personnel proficient in data science and supply chain management to derive actionable insights from BDA tools effectively.

Leadership commitment is another essential enabler, as support from top management fosters a culture of innovation and data-driven decision-making. Lamba & Singh (2018) stress the importance of leadership in driving organizational adoption of BDA technologies and cultivating an environment conducive to innovation.

Furthermore, regulatory support and financial resources are essential for successful BDA implementation. Adequate funding allows organizations to invest in necessary infrastructure and tools, while adherence to regulatory standards ensures data privacy and compliance, particularly when handling sensitive information. This dual support, as noted by CİĞERCİ (2023) and Bamel & Bamel (2020), is relevant for sustaining long-term adoption and leveraging the full potential of BDA in supply chains.

Challenges to Integrating Big Data Analytics (BDA) in the S upply Chain

Despite the clear enablers, various challenges hinder the effective implementation of BDA in supply chains. One significant challenge is **data privacy and security**, which remains a primary concern for organizations, particularly in sectors like healthcare. As Harerimana et al., (2018) highlight, ensuring that sensitive data is protected and complies with regulations such as HIPAA is both challenging and costly, creating barriers to BDA adoption.

Data quality and standardization also pose significant hurdles. Inconsistent data quality and lack of standardized data formats can severely undermine the benefits of BDA, leading to inaccurate analyses and decision-making, as noted by Williams and Brown (2020). Additionally, the high costs associated with implementing BDA are a major barrier, particularly for smaller organizations or those in developing regions. As Lee and Harris (2019) suggest, without sufficient financial resources, many organizations cannot invest in the required technology, personnel, and infrastructure needed for successful BDA adoption.

Organizational resistance to change is another challenge that can slow down the BDA implementation process. Healthcare staff, in particular, may resist adopting new technologies that disrupt existing workflows. Islam et al (2018) emphasize the importance of effective change management strategies to overcome this resistance.

Furthermore, the complexity of healthcare data complicates BDA implementation. Healthcare data is heterogeneous, involving varied formats and sources, which makes aggregation and analysis more difficult. As Thompson (2020) points out, sophisticated algorithms and models are needed to process such complex data effectively.

Lastly, the lack of data-sharing protocols between organizations is a significant obstacle. Agrawal and Madaan (2023) emphasize that without standardized data-sharing mechanisms, collaboration across organizations is hindered, limiting the ability to leverage BDA for improved supply chain operations.

CONCLUSION

This research aims to investigate The Importance of Utilizing Big Data Analytics in U.S. Healthcare Supply Chain Management.
A literature review conducted to establish the existing body of knowledge on the use of BDA in SCM established that there is an increasing trend in the documentation on this subject, particularly in the health sector. The review established the publication trend over the recent past, revealing a high level of awareness of the power of BDA to enhance the practice of SCM. The reviews revealed that Big Data Analytics integration optimally improves the Health Care Supply Chain Management (HCSCM). BDA enhances several key activities: inventory management, order management, demand planning, and order fulfillment. In the case of real-time analytics, BDA supports the improvement of the key decisions made by healthcare organizations to manage resources, minimize expenses, and increase service delivery quality. The enhanced decision-making at the micro level – in real-time, also enhances the healthcare supply chain's flexibility and transparency to dynamic demand and supply conditions. Furthermore, the implementation of BDA also provides the possibilities of predictive analysis, enhances the accuracy of the forecast, and allows healthcare supply chains to meet the need for patient care while avoiding a situation of either deficiency of supply or supply surplus.

According to the literature, there are several enablers necessary for the integration of BDA within healthcare supply chains. Some of them are effective technology that will enable organizations to work with high internet, cloud collaboration as well as data storage in enabling the execution of big data analytics. The stability of data between systems and across the care continuum is also important; where needed, the flow of important information between different departments must be fluid. An adequate number of skilled workforces is another enabler for healthcare organizations that need data scientists and healthcare logistics to implement BDA. There are also other measuring factors such as quality leadership support, sufficient financial requirements, and compliance regulations to counteract the barriers to successful implementation. However, the following are the challenges that hinder the optimal utilization of BDA in the Healthcare supply chain. Various restrictions, including data privacy and security issues, are still a problem, especially in light of ever-growing protections for healthcare information under HIPAA. One of the significant challenges tangled in this research involves the quality of the data, such as inconsistency and lack of

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homogeneity in format across different systems. High implementation cost is another key issue; and staff training, which seems to be a recurring issue with reference to information system implementation, is also a challenge. Last but not least, it is a challenge that organizational resistance to change arises from one or many employees in the organization who may not be on board with the new ideas of change and SCM operating via BDA.

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